Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period:\_\_\_\_\_\_ Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Chapter 3

Key Terms:

* Velocity- The rate at which an object changes its position
* Acceleration-The rate at which the velocity of an object changes

How do we use velocity and acceleration together?

http://physicalscienceteacher.com/images/acceleration.png

With this equation, you can solve for velocity, acceleration, and even time of an object in motion!

Ex:  
Try solving for the **time** it takes for a skateboard to move across the street if the skateboard’s acceleration is 8.0 m/s², and its velocity is 32 m/s.

Just solve for ‘t’ !



Known: Unknown: Equation:

a = 8.0 m/s² t = ? a = Δv

v = 32 m/s Δt

8.0 m/s² = 32 m/s 🡪 (t) 8.0 m/s² = 32 m/s 🡪 t = 32 m/s 🡪 t = 4 sec

t 8.0 m/s²

Remember that acceleration can be both positive AND negative acceleration. (For the illustrated example below, imagine the right side of this worksheet represents the positive direction, and the left side of this worksheet represents the negative direction.)



POSITIVE ACCERATION NEGATIVE ACCELERATION



POSITIVE ACCELERATION NEGATIVE ACCELERATION

Now that you get the hang of velocity and acceleration, let’s move on to some more complex equations that not only involve velocity, acceleration, and time, but also *displacement,* which represents the distance from an initial point, to a final point. REMEMBER: Displacement has direction!

Here are the new “complex” equations:

2. ) Δx =

3.)

4.)

Let’s try an example. The tricky part is deciding what equation to use. That’s why you should read the question carefully!

The rollercoaster, “Raging Bull” at Six Flags is 202 feet high and 5057 feet wide. It has the whoppin’ speed of 73 mph and the entire duration of the ride is 2 minutes and 30 seconds (true facts!) Solve to find the acceleration of “Raging Bull.”

In this case, we chose equation 1. We won’t use any equation that incorporates displacement because it is not given in the equation, and we are not solving for it. Therefore, we should choose from equation 1 and 4. We ultimately will use equation 1 because it has what we know (velocity and time) and it has what we are solving for (acceleration).

Known: Unknown: Equation:

v- 73 mph a- ? t- 0:2:30

We first need o convert 2 minutes and 30 seconds to just seconds. We should multiply 2 and 60 to find what 2 minutes is equal to in seconds. We find that it is 120 seconds. Don’t forget though that we still have to add the remaining 30 seconds. The total time then is 150 seconds.

Now it’s time to plug and chug! \*Also remember that is the same thing as v !

73 mph = a (150 s) 🡪 73mph = a 🡪 .49 m/s² = a

150 s

That was easy. Let’s try a harder one. Keep in mind that when an object is in free fall, its acceleration is -9.8 m/s².

While skydiving, Yolanda is in free fall for 5 seconds. How far is Yolanda after 5 seconds?

Wait, do we have enough information? Sure we do! Check it out!

Known: Unknown: Equation:

= 0 Δx Δx =

t = 5 s

a = -9.8 m/s²

Δx = (0) (5) + (-9.8) (5)² 🡪 Δx = -122.5 m 🡪 The negative sign in front of the displacement represents the direction of the distance. (It must be in the negative direction.)

Check out these websites!   
 <http://www.physicsclassroom.com/Class/1DKin/U1L1e.cfm>

<http://www.physicsclassroom.com/Class/1DKin/U1L1e.cfm>

http://www.physicsclassroom.com/mmedia/kinema/acceln.cfm

http://www.physics4kids.com/files/motion\_velocity.html